

## CLAIMS

1. Ionising particle analyser comprising:  
a source of ionising primary particles;  
a charged particle detector;  
an ionisable gas located between the source and the detector; and  
wherein the analyser further comprises a charged particle impeding device located between the source and the detector, and arranged to be maintained in a first configuration at a potential to impede the passage of secondary electrons generated by charged primary particles ionising the gas and pass uncharged particles.
2. An analyser according to claim 1, wherein the charged particles comprise electrons and the uncharged particles comprise photons.
3. An analyser according to claim 1 or claim 2, wherein the charged particle impeding device is held at a potential to repel the charged secondary electrons generated in the gas by the primary particles.
4. An analyser as claimed in any one of the above claims, wherein the charged particle impeding device comprises at least one bar lying in a plane substantially parallel to a surface of the sample.
5. An analyser as claimed in any one of the above claims, wherein the charged particle impeding device comprises a grid comprising a plurality of substantially parallel bars.
6. An analyser as claimed in any one of the above claims, wherein the charged particle impeding device is further arranged to be maintained in a second configuration that allows the substantially unimpeded passage of both charged particles and uncharged particles.

7. An analyser according to any one of the above claims, wherein the charged particle impeding device is located within the ionisable gas, and spaced from the source such that charged particles emitted from the source will have been substantially completely converted to ionised gas electrons prior to being incident upon the charged particle impeding device.
8. An analyser as claimed in any one of the above claims, wherein the source is a sample and means are provided for exposing the sample to a beam of radiation, the energy of which is sufficient to cause ionising particles to be emitted from the sample.
9. An analyser according to claim 8, wherein the exposing means comprises an X-ray source.
10. An analyser according to claim 8 or claim 9, wherein the sample defines a surface which is substantially planar and the beam is directed towards the sample in a direction inclined to a normal to the sample surface.
11. An analyser according to claim 10, wherein the beam is directed at a glancing angle relative to the sample surface.
12. An analyser as claimed in any one of claims 8 to 11, wherein the beam is arranged to pass between the source and the charged particle impeding device, so that the beam is not occluded by said device.
13. An analyser as claimed in any one of the claims 8 to 11, wherein the beam is arranged to pass through the charged particle impeding device, the analyser further comprising a guard electrode located between the charged particle impeding device and the charged particle detector, and overlying at least the area of the charged particle impeding device through which the beam passes.

14. An analyser as claimed in any one of the above claims, wherein the detector comprises at least one pair of electrodes, the electrodes of the pair being spaced apart by a distance that is substantially less than the spacing between the source and the detector, the electrodes of the pair being maintained at different potentials, and the source being maintained at a potential different from the potential of the electrodes, the potentials being selected such that charged particles emitted by the source are attracted from the source towards each of the pair of electrodes, such that secondary charged particles adjacent the detector are accelerated to energies sufficient to ionise the gas.

15. A method for analysing ionising primary particles emitted by a source, wherein an ionisable gas is located between the source and a charged particle detector, and a charged particle impeding device is located between the source and the detector; the method comprising:

maintaining the charged particle impeding device at a potential to impede the passage of secondary electrons generated by charged primary particles ionising the gas and pass uncharged primary particles; and

detecting, at the charged particle detector, charged particles formed by at least the ionisation of the gas by the uncharged primary particles.

16. A method as claimed in claim 15, wherein the step of detecting charged particles is repeated whilst the charged particle impeding device is maintained at a range of different potentials.

17. A method as claimed in claim 15 or claim 16, further comprising the step of: maintaining the charged particle impeding device at a potential to allow the substantially unimpeded passage of both charged particles and uncharged particles; and

detecting, at the charged particle detector, charged particles formed by the ionisation of the gas by both the charged ionising particles and the uncharged ionising particles.

18. An ionising particle analyser substantially as hereinbefore described with reference to the accompanying figures.

19. A method for analysing ionising particles substantially as hereinbefore described with reference to the accompanying figures.